IN THE SPECIFICATION:

Please amend the specification as follows:

Please replace the paragraphs beginning at page 1, line 6 through page 2, line 13 with the following rewritten paragraphs.

The present invention relates to a purification system of exhaust gases; and, more particularly, to a purification system of exhaust gases of an internal combustion engine for vehicles for using precious metals as a high temperature active catalyst, e.g., a 3-way catalytic converter, and for using a photocatalyst coated ~~in~~ on a honeycomb as a low temperature catalyst, in which both reactions of an oxidation and a reduction are simultaneously accomplished in high and low temperatures by using a low temperature plasma as a photic source to thereby purify pollutants contained in the exhaust gases and ~~a consume~~ power consumption and ~~a generating~~ strength of the plasma photic source are maintained depending upon an installing position of electrodes.

BACKGROUND OF THE INVENTION

Generally, an internal combustion engine is a heat engine for reciprocating a piston by explosively burning a fuel mixed with ~~an~~ air in cylinders. Exhaust gases generated in burning are exhausted ~~into an exterior~~ externally through an exhaust apparatus 10, as shown in Fig. 1~~.~~, comprising an exhaust manifold 12 collecting the exhaust gases in each of the cylinders, an exhaust pipe 14 for exhausting them into the exterior, a muffler 16 for reducing an exhaust noise, and a catalytic converter 18 for oxidizing and reducing noxious components in the exhaust gases to thereby ~~be harmlessly~~ make them harmless. However, since harmless ~~nullifications~~

components such as unburned hydrocarbon, carbon monoxide, nitrogen oxide, sulfur oxide, etc. are contained in the exhaust gases, the exhaust gases exhausted from the cylinders should be collected, purified at a purification system disposed at a middle of the exhaust pipe 14, and then exhausted to the exterior.

Please replace the paragraphs beginning at page 2, line 26 through page 3, line 23 with the following rewritten paragraphs.

However, in the case of purifying the exhaust gases by using the 3-way catalyst, it ~~is~~ has a shortcoming in that ~~heats need~~ heat is needed to ~~active~~ activate the catalyst as well as the catalysis thereof is performed only ~~in~~ at a predetermined temperature. That is, ~~in a predetermined temperature~~ before the catalyst is activated at the predetermined temperature, such as an initial stage of starting an engine for vehicles, noxious components are not smoothly removed~~, more specially~~ . In other words, when the catalyst ~~is~~ has not reached ~~to~~ a specific active temperature, the exhaust gases are exhausted in air just as the hydrocarbon that is not purified.

Further, in order to perform both reactions of ~~an~~ oxidation and a reduction, since it must be ~~closed~~ close to a theoretic mixture ratio, it ~~is~~ has a shortcoming in that an exhaust condition is restricted. Accordingly, when only ~~it~~ the mixture ratio is ~~closed~~ close to the theoretic mixture ratio, ~~it is limited to reduce~~ the noxious components such as unburned hydrocarbon, carbon monoxide, and nitrogen oxide, etc. are reduced. In other words, when a fuel is rich, the purification to hydrocarbon and carbon monoxide is suddenly reduced, while when air in the fuel is rich, the purification to nitrogen oxide is suddenly reduced.

~~In recent~~ Recently, it has been studied in various fields in order to improve a fuel rate and to reduce a deflection of carbon dioxide for reducing a green house

effect.

Please replace the paragraphs beginning at page 4, line 3 through page 7, line 23 with the following rewritten paragraphs.

That is, in case of the lean burn engine or the gasoline direct injection engine, since the engines ~~is~~ are driven at a rich supply of air, an oxygen of 10% and more and a large amount of nitrogen oxide ~~exist~~ exists in the exhaust gases depending upon ~~an~~ a lean burn combustion condition. Thus, it is a restriction that the large amount of nitrogen oxide cannot be sufficiently purified by only the 3-way catalyst.

Specifically, in case of a diesel engine, it is a problem that a particulate material is generated using a low grade fuel, a large amount of nitrogen oxide is ~~caused~~ produced by the lean burn and the purification capability of the exhaust gases is remarkably deteriorated by oxygen.

In order to overcome these problems, a nitrogen oxide reducing system and a nitrogen oxide absorbing system using low temperature plasma are recently used ~~in recent~~. These purification systems are mainly used as a fixed internal combustion engine or a ~~desulfurization~~ desulphurization or denitration system of a large engine to thereby purify nitrogen dioxide in the exhaust gases by using a reducing agent such as urea or ammonia, etc. into nitrogen and oxygen.

These low temperature plasma purification systems comprise electrodes in an induction tube in which exhaust gases flow, the electrodes being ~~applied into~~ supplied with a power supply such as the direct current (DC) or an alternate current (AC) in order to generate the plasma. When the exhaust gases pass through the induction tube, moisture, oxygen or nitrogen and the like ~~existed~~ existing in the exhaust gases are ionized or dissociated by the low temperature plasma to thereby generate a free radical, thereby purifying contaminants. (See SAE982428)

However, since these low temperature plasma purification systems need a high energy and a supplying apparatus and since a reactor ~~are~~ is relatively bulky relative to an amount of exhaust gases, a matter to be purified is limited to nitrogen oxide and sulfur oxide. That is, even though these systems are suitable to a fixed internal combustion engine for reducing hydrocarbon and nitrogen oxide of a low concentration of about 1000ppm, it is a shortcoming in that enormous energy corresponding to 2% of an internal combustion engine output is consumed in order to ~~active~~ activate the plasma as well as a volume of the respective systems is increased 10 times or more. Further, since the systems ~~occupy~~ are bulky in a large installation space, it is unsuitable to be used ~~to~~ with general automotive vehicles requiring a moving activity and restricting ~~a~~ useful energy.

In order to reduce noxious components in the initial stage of starting ~~of~~ at cold temperature, energy is supplied from a power supply of a condenser ~~only without being supplied~~ , not from a generator. Thus, since energy capacity is small in an energy system of the existing vehicles, the purification of the exhaust gases cannot ~~perform~~ be performed, while when energy capacity is increased, it should be concomitant with subsidiary facilities, causing a cost ~~up~~ as well as an installation problem. Further, in order to reduce relatively high unburned hydrocarbon components of about 6000ppmC in the exhaust gases, a plasma reactor having significant large volumes and a predetermined space needs to install the plasma reactor in vehicles, but, since the installation space of vehicles is limited as is generally known, it is ~~realistically limited in installing~~ unrealistic to install a high volumetric plasma reactor in vehicles.

Furthermore, an additive such as urea and unburned hydrocarbon needs to convert nitrogen oxide under an oxidation atmosphere. The additive is easily

supplied in a fixed type internal combustion engine, but in case of vehicles, it is a problem that an additive supplying system is additionally mounted in the vehicles and it is ~~a~~ difficult to secure an installation space of the supplying system in the vehicles and it is hard for drivers to get to continuously supply the additive at a regular interval such as at a time of a fuel ~~pouring in~~ filling.

~~In recent~~ Recently, ~~it has been researched~~ a system of combined ~~the~~ low temperature plasma purification system with the 3-way catalyst purification system has been investigated. That is, the 3-way catalyst purification system is disposed to a backward portion of a plasma reactor to thereby purify unburned hydrocarbon untreated by plasma reaction (See SAE982427, 982429, 982508).

However, since the combination system consumes high energy for generating the plasma and the volume thereof is bulky, it is not preferable to use ~~to~~ in a moving type internal combustion engine.

On the other hand, a purification system using a photocatalyst irradiates a photic source having a specific wavelength to the photocatalyst, for example TiO_2, and then purifies contaminants by a free radical generated in ~~exiting~~ exciting the photocatalyst. Further, the photocatalyst takes part in a purification reaction of nitrogen oxide as well as an oxidation reaction of carbon monoxide and hydrocarbon, thereby performing an activation without regard to energy or temperature condition (J. of Photochemistry and Photobiology AL Chemistry 111, pp199-203, 1997).

Please replace the paragraphs beginning at page 8, line 25 through page 11, line 10 with the following rewritten paragraphs.

However, the above patents employing the above described purification method are a fixed type purification system which is designed to be fixed in place to

have a specific amount. Accordingly, although the patents may be useful for purifying an indoor air of a large sized building, e.g., a limited amount of air, they are still inadequate to ~~be~~ freely stick to a purification amount because ~~an~~ of extra installation expense and an operating cost are required ~~therefor~~ therefore.

It is, therefore, an object of the present invention to provide a purification system of exhaust gases of an internal combustion engine for vehicles for using precious metals as a high temperature active catalyst, e.g., a 3-way catalytic converter, and for using a photocatalyst coated ~~in~~ on a honeycomb as a low temperature catalyst, in which both reactions of an oxidation and a reduction are simultaneously accomplished in high and low temperatures by using a low temperature plasma as a photic source to thereby purify pollutants contained in the exhaust gas and a ~~consume~~ power consumption and a generating strength of a plasma photic source ~~are maintained depending~~ dependent upon an installing position of electrodes.

It is ~~an~~ another object of the present invention to provide an atmospheric purification system for purifying the atmosphere during driving of vehicles and an operation of an air-conditioner thereof regardless of a settled purification amount by coating a photocatalyst on a heat exchanger and irradiating light thereto because an internal combustion engine of the vehicles is cooled by the atmosphere in moving, e.g., an air-cooled type, and a condenser of the air-conditioner is exposed to the atmosphere.

It is a still another object of the present invention to provide a deodorizing and atmospheric purification system for purifying pollutants and a bad smell in air by generating a plasma after coating a photocatalyst and a precious metal catalyst on a carrier and irradiating ~~photo~~ photon from a photic source.

The above and other objects of the present invention are accomplished by

providing a purification system of exhaust gases in an internal combustion engine for purifying the exhaust gases by disposing a reaction furnace capable of reducing noxious components of the exhaust gases in an exhaust pipe of the internal combustion engine, the system comprising:

A reactor including a honeycomb carrier having a plurality of carrier cells, each of which a photocatalyst layer is coated on, in the reaction furnace, and a plasma generating means having a plurality of electrode cells and mounted on an inner end and an outer end of the honeycomb carrier.

In accordance with a preferred embodiment of the present invention, the honeycomb carrier includes a 3-way catalyst layer coated on a wall surface of each of the carrier cells and a photocatalyst layer coated on the 3-way catalyst layer, the photocatalyst layer being activated by a plasma photic source. Further, a volume and a number of each of the electrode cells are varied depending upon the variation of ~~that of~~ each of the carrier cells, the carrier cells having 100 – 900 numbers per the united area (1 inch X 1 inch).

Please replace the paragraphs beginning at page 11, line 26 through page 12, line 13 with the following rewritten paragraphs.

In accordance with a still another embodiment of the present invention, an atmospheric purification system comprising a photocatalyst coated on a heat exchanger of automotive vehicles; and a photic source, wherein an atmosphere including pollutants passes through the heat exchanger to cause it to be purified by the photocatalyst ~~exited~~ excited thereby, wherein the heat exchanger includes a radiator ~~flowing~~ with an internal circulating fluid of an internal combustion engine of the automotive vehicles therein and having a plurality of cooling pins for a heat

exchanging, and the heat exchanger includes a condenser having a plurality of cooling pins operating as part of an air-conditioner of the automotive vehicles, the photocatalyst being coated on the plurality of cooling pins.

Please replace the paragraph beginning at page 14, line 1 through page 14, line 3 with the following rewritten paragraph.

Fig. 12~~.~~ gives a schematic view when an oxygen supplying portion is disposed to an exterior of an exhaust pipe;

Please replace the paragraph beginning at page 15, line 11 through page 15, line 13 with the following rewritten paragraph.

The reaction furnace as shown therein is in ~~the form of~~ a cylindrical form and includes an exhaust pipe 14 connected to ends thereof.

Please replace the paragraph beginning at page 16, line 5 through page 16, line 10 with the following rewritten paragraph.

A photocatalyst layer and a 3-way catalyst layer are coated on a surface of each of the carrier cells 34, more ~~preferable~~ preferably, the 3-way catalyst layer is coated on a wall surface of each of the carrier cells 34 and the photocatalyst layer activated by a plasma photic source is coated on the coated 3-way catalyst layer.

Please replace the paragraphs beginning at page 17, line 5 through page 19, line 4 with the following rewritten paragraphs.

A mixture mixed ~~platuinum~~ platinum with rhodium is usually used as the 3-way catalyst, but it is preferable that the mixture may further include palladium.

On the other hand, each of the electrodes 40 is comprised of a pair of wire meshes 42a and 42b, each having a plurality of electrode cells by crossing wires, the wires being made of a ~~conductibility~~ conductive material. Each of the wire meshes 42a and 42b is disposed at an interval from both ends of the honeycomb carrier 30, and, more ~~preferable~~ preferably, the wire mesh 42a is disposed to one end of the honeycomb carrier 30 is disposed at a certain distance from the honeycomb carrier 30, while the wire mesh 42b ~~is~~ disposed to the other end of the honeycomb carrier 30 is closely disposed to the honeycomb carrier 30. For example, the distance between the honeycomb carrier 30 and the wire mesh 42a is about 1-40% of the honeycomb carrier length and is preformed as 2mm, 4mm and 5.5mm, respectively, in this embodiment.

Since the wire meshes 42a and 42b are made of ~~conductibility~~ conductive material, the wire meshes 42a and 42b are conducted through the honeycomb carrier 30 when a power supply is applied to the wire meshes 42a and 42b.

Each of the wire meshes 42a and 42b is connected to a terminal 44 extended ~~to an external~~ externally of the reaction furnace 20. An insulator 46 is formed on an outer surface of the terminal 44 to thereby insulate from the reaction furnace 20. The terminal 44 is connected to an external power supply. It may use AC or DC as the power supply, but AC power supply of 20KV and 20mA is used in this embodiment.

It is preferable that junctions 48 formed by crossing wires of each of the wire meshes 42a and 42b are located at a center of each of the carrier cells 34, but may be located in the vicinity of an edge of each of the carrier cells 34 because the position of the junctions 48 is changed depending upon an amount of the exhaust gases to be treated and a concentration of pollutants in the exhaust gases.

The ~~more~~ longer the distance between the honeycomb carrier 30 and the

electrode 40 in the reaction furnace 20 as constructed above is ~~far,~~ the more power consumption is ~~consumed,~~ while a photic amount of plasma ~~is increased~~ increases. Hence, in order to simultaneously satisfy the photic amount of plasma and an energy effect in the present invention, one electrode 40 is closely disposed to one end of the honeycomb carrier 30, while the other electrode 40 is far from the other end of the honeycomb carrier 30.

Further, it is preferable that a volume and a number of the carrier cells 34 and the electrode cells are varied depending upon the amount of the exhaust gases and the concentration of the pollutant therein. That is, the volume and the number of ~~each of~~ the electrode cells are varied depending upon the variation of ~~that of each~~ those of the carrier cells, the carrier cells having 100 – 900 numbers per ~~the~~ unit area (1 inch X 1 inch).

Please replace the paragraphs beginning at page 19, line 15 through page 21, line 21 with the following rewritten paragraphs.

At this time, since the junctions 48 are located at the center of each of the carrier cells 34 and the honeycomb carrier 30 is made of ceramic to thereby apply an electric current thereto, the respective electrodes 40 located at both ends of the carrier cells 34 are conducted to allow the plasma to be discharged in each of the carrier cells 34.

When the wire mesh 42a is disposed at an interval from the honeycomb carrier 30 and the wire mesh 42b is closely disposed thereto, the photic amount generated at the wire mesh 42a is larger than that generated at the wire mesh 42b and, in this case, the ~~consume~~ power consumption is smaller than ~~that at~~ the case where the wire meshes 42a and 42b are disposed at an interval from the honeycomb

carrier 30.

Further, when the wire meshes 42a and 42b are closely disposed to the honeycomb carrier 30, the ~~consume~~ power consumption is reduced, but ~~it cannot be obtained to~~ a desired purification ~~effect~~ efficiency cannot be obtained because a plasma photic amount becomes low.

The plasma generated as described above ~~actives~~ activates the photocatalyst of the photocatalyst layer coated on a wall 32 of the carrier cells 34 to thereby produce a free radical capable of purifying unburned hydrocarbon and nitrogen oxide.

Since the plasma is diverged from the junction of the electrodes 40 to each of the carrier cells 34, the photocatalyst reaction is introduced by small energy. Further, the exhaust gases are purified and, at the same time, additional ~~heats are~~ heat is supplied to an existing heat in the exhaust gases because the photocatalyst reaction is mostly exothermic reactions, allowing ~~heats~~ heat to be transmitted to the 3-way catalyst layer coated to a lower portion of the photocatalyst layer.

The 3-way catalyst is further activated due to the transmitted ~~heats~~ heat to thereby improve the purification of monoxide carbon, hydrocarbon, nitrogen oxide and the like.

The 3-way catalyst ~~moves up~~ prolongs an effective activation ~~reaching~~ time relative to the purification reaction using only ~~heats~~ heat in the exhaust gases such as the prior art. Further, in the purification reaction of the present invention, the photocatalyst reaction and the 3-way catalyst reaction are concurrently performed, thereby greatly increasing the purifying ~~effect~~ efficiency. Furthermore, the purification reaction is added by a free radical generated by the plasma, further increasing the effect.

Also, since the ~~power consumes~~ amount ~~generating the~~ of plasma ~~are~~

~~properly maintained~~ generated is sustained by maintaining proper power consumption levels, the purification ~~effect~~ efficiency as well as energy efficiency are improved.

Fig. 4 is a modifying embodiment of Fig. 2, wherein a reactor employs a honeycomb electrode as an electrode therein. Fig. 5 is taken along A-A lines in Fig. 2.

The electrodes 50a and 50b are disposed to both ends of the honeycomb carrier 30 being similar to that of Fig. 2. Further, the electrodes are in the form of a ~~cylindrical~~ cylinder and formed to have a predetermined length in a vertical direction, the cross section thereof being of a honeycomb type having a plurality of electrode cells 52a and 52b as described above, thereby having durability to an external impact. These electrode cells 52a and 52b may be prepared in the form of various ~~type~~ types such as triangle and hexagon, but in the ~~modification~~ modified embodiment it is in the form of a tetragon as described above.

Please replace the paragraphs beginning at page 22, line 3 through page 22, line 20 with the following rewritten paragraphs.

For example, when the ~~distance~~ length of the honeycomb carrier 30 is about 40mm, the ~~distinct length~~ distance between the honeycomb carrier 30 and the honeycomb electrode 50a is about 1 – 40% of the honeycomb carrier length and is performed as 2mm, 4mm, and 5.5mm, respectively, in this embodiment.

It is preferable that the honeycomb electrodes 50a and 50b are made of a metal having conductibility capable of conducting between the honeycomb electrodes.

It is preferable that the honeycomb electrodes 50a and 50b are in the form of a disc, the diameter thereof being similar to that of the honeycomb carrier 30. Extended to an ~~external~~ exterior of the reaction furnace 20 are electrode terminals

54a and 54b which are disposed to an outer periphery of each of the honeycomb electrodes 50a and 50b to be thereby connected to the power supply 56. It may use AC or DC as the power supply 56, but in this ~~modification~~ modified embodiment, AC power supply of 20KV and 20mA is used.

Please replace the paragraphs beginning at page 23, line 18 through page 23, line 25 with the following rewritten paragraphs.

A mixture ~~mixed~~ of platinum with rhodium is used as the 3-way catalyst being similar to that coated ~~to~~ on the honeycomb carrier 30 as described above, but the mixture further ~~including a~~ includes palladium.

Accordingly, the inventive purification system can improve the purification ~~effect~~ efficiency by performing the purification reaction at the honeycomb carrier 30 as well as the honeycomb electrodes 50a and 50b.

Please replace the paragraphs beginning at page 24, line 8 through page 25, line 25 with the following rewritten paragraphs.

In the same manner as described ~~to~~ for the embodiment of Fig. 2, a magnitude and a number of the carrier ~~cell~~ cells 34 and the electrode cells 52a and 52b are varied depending upon the amount of the exhaust gases and the concentration of pollutants therein.

The operation of the purification system of the exhaust gases in an internal combustion engine in accordance with a ~~modification~~ modified embodiment of the present invention will be described hereinbelow.

When the internal combustion engine operates, the exhaust gases are introduced into the reaction furnace 20 and, at the same time, a power supply 56 is applied to the electrode terminals 54a and 54b to thereby allow a current to flow

into the ~~honey~~ honeycomb electrodes 50a and 50b located at both ends of the honeycomb carrier 30.

Hence, a plasma is discharged from an edge 62 of the electrode cell 52a located at one end of the carrier cell 34 to the edge 62 of electrode cells 52b located at the other end thereof. At this time, the edge 62 is located at a center of each of the carrier cells 34 and the honeycomb carrier 30 is made of ceramic to ~~not~~ thereby ~~flow~~ prevent a current from flowing therethrough, the honeycomb electrodes 50a and 50b located at both ends of the honeycomb carrier 30 are conducted to each other to allow the plasma to be discharged into an internal portion of each of the carrier cells 34.

The plasma photic amount generated at the honeycomb electrode 50a distinctly disposed from the honeycomb carrier 30 is larger than that generated at the honeycomb electrode 50b closely disposed to the honeycomb carrier 30. In order to obtain an additional plasma photic amount, all of the honeycomb electrodes 50a and 50b are distinctly disposed from the honeycomb carrier 30, but it is preferable that one electrode 50a is closely disposed to the honeycomb carrier 30, while the other electrode 50b is distinctly disposed therefrom.

The discharged plasma activates the photocatalyst of the photocatalyst layer coated on a surface of the carrier cells 34 to thereby produce a free radical, purifying unburned hydrocarbon, nitrogen oxide, and carbon monoxide. Since the photocatalyst reaction shows a regular purification capability in all of the ranges of the mixture ratio regardless of the theoretic mixture ratio of an internal combustion engine, the purification capability is continuously maintained although the engine is operated at a range ~~exception of the theoretic~~ ratio, not just at the theoretical mixture ratio.

Please replace the paragraphs beginning at page 26, line 8 through page 28, line 16 with the following rewritten paragraphs.

The exhaust gases are purified and, at the same time, additional ~~heats are~~ heat is supplied to an existing heat in the exhaust gases because the photocatalyst ~~reaction is~~ reactions are mostly exothermic reactions, allowing ~~heats~~ heat to be transmitted to the 3-way catalyst layer coated to a lower portion of the photocatalyst layer.

The 3-way catalyst is activated due to the transmitted ~~heats~~ heat to thereby purify a carbon monoxide, a hydrocarbon, and a nitrogen oxide. That is, assuming the swerve from the theoretic ration of the internal combustion engine, when the exhaust gases are exhausted by a combustion of lean condition having an abundant oxygen, the catalyst oxidizes unburned hydrocarbon and carbon monoxide, while when the exhaust gases are exhausted by a combustion of a condition having a poor oxygen, the catalyst deoxidizes nitrogen oxide.

In the purification system of the internal combustion engine in accordance with the present invention, the 3-way catalyst reaction is performed by ~~heats~~ heat produced ~~in~~ while generating the plasma at the honeycomb carrier 30 as well as a surface of the electrode cells 52a and 52b of the honeycomb electrodes 50a and 50b to thereby purify the exhaust gases and, further, although the plasma is not generated, the purification reaction is continuously maintained, thereby improving the purification ~~effect~~ efficiency.

The 3-way catalyst concurrently reacted at the honeycomb carrier 30 and the honeycomb electrodes 50a and 50b moves up an effective activation ~~reaching~~ time more than that is a purification reaction using ~~heats~~ heat in the exhaust gases such as the prior art. Further, in the purification reaction of the present invention, the photocatalyst and the 3-way catalyst reactions are concurrently performed,

thereby maximizing the ~~effect~~ efficiency. Furthermore, ~~the~~ an additional purification reaction is ~~added~~ carried out by a free radical generated by the plasma, thereby increasing the effect and, although the plasma is not generated, the purification reaction is also improved by generating the 30way catalyst reaction due to the additional ~~heats~~ heat generated ~~by the heats~~ in the exhaust gases.

Also, since power ~~consumes~~ generating the plasma is properly maintained, the purification ~~effect~~ as well as energy ~~effect~~ efficiency is improved.

As shown in Fig. 6 and Figs. 7A and 7B as ~~an~~ another modifying embodiment, wherein a reactor employs a wire mesh roll or a punched plate as an electrode therein, allowing a plasma to be discharged to a ceramic carrier cell. The construction of this embodiment is similar to that of the above described embodiment and the ~~modifying~~ modified embodiment and, in the same manner of the embodiment in Fig. 2, it is preferable that the junctions formed by crossing the wires of the wire mesh rolls or the projections provided in the punched plate are located at a center of each of the carrier cells, but it is of course that the junctions or the projections may be located in the vicinity of edges of each of the carrier cells depending upon the amount of the exhaust gases and a concentration of pollutants therein.

The above description is ~~describing that~~ for a case when only one reactor is mounted on the reaction furnace, but ~~it is that~~ the reactor as described above may be pluralized to thereby improve the ~~effect~~ efficiency of the purification system and may be properly disposed depending upon an amount of the pollutants included in the exhaust gases. In Fig. 8, a number of reactors 24 of Fig. 2 are pluralized in the reaction furnace 20.

Please replace the paragraph beginning at page 29, line 6 through page 29,

line 13 with the following rewritten paragraph.

On the other hand, these inventors noticed that an exhausting purification effect is improved depending upon an oxygen concentration of exhaust gases introduced into an exhaust gases purification system of an internal combustion engine as shown in Fig. 9. An experiment device as shown in Fig. 10 is used in order to measure the effect, the device comprising a gas supplying portion, ~~a~~ an ultraviolet reacting portion, and an analyst portion.

Please replace the paragraph beginning at page 30, line 7 through page 30, line 17 with the following rewritten paragraph.

The photic source required to a photo activity employs ~~a~~ an ultraviolet lamp of 200W filled with mercury having ~~of~~ a main wavelength of 360nm. The reactor is a quartz tube having a diameter of 3/8" and a length of 250 mm and a quartz filter is provided with a middle portion of the reactor. It is equally treated in all ~~experiment~~ experiments that the flow rate of the reaction gases introduced into the reactor is 30cc/min and a catalyst amount is 0.05g and ~~an~~ a compressed air is supplied around ~~a~~ an ultraviolet lamp in order to press a zooming of the reaction temperature due to ~~heats~~ heat discharged from the lamp.

Please replace the paragraphs beginning at page 31, line 2 through page 31, line 14 with the following rewritten paragraphs.

Fig. 9 shows an exhausting purification ~~effect~~ efficiency (propane conversion rate) according to an oxygen concentration measured by the experiment method of table 1. As known in Fig. 9, it is noticed that when the oxygen concentration is increased up to 5%, the ~~effect~~ efficiency (is greatly increased, while when the concentration is increased by 5% or more, the increasing

rate of the ~~effect~~ efficiency is significantly decreased and when the concentration is below 50%, the increasing rate is low as below 80%.

Accordingly, in the photocatalyst system, when the oxygen concentration of the exhaust gasses in the exhausting pipe is artificially ~~maintains~~ maintained at 5% or more, the ~~effect~~ efficiency of the system is improved.

Please replace the paragraphs beginning at page 32, line 2 through page 35, line 23 with the following rewritten paragraphs.

As shown in Fig. 11, in case of installing the oxygen supplying portion 80 in the exhausting pipe 14, when the pressure in the reaction furnace is lower than the atmospheric pressure, a force for pushing the plate 84 by the atmospheric pressure is introduced to the spring 86, while when the difference is larger than the stiffness of the spring 86, the spring 86 is compressed to thereby open the plate, resulting in ~~that an~~ external air ~~is~~ being introduced into the exhausting pipe 14. That is, if the atmospheric pressure Po is larger than the sum of the pressure Pi in the exhausting pipe 14 and the pressure Ps of the spring 86, the plate 84 is opened as following formula:

$$Po > Pi + Ps$$

As shown in Fig. 12, in case of installing the oxygen supplying portion 80 to an ~~external~~ exterior of the exhausting pipe 14, if Po + Ps > Pi, the plate 84 is opened to thereby allow the external air to be introduced into the exhausting pipe 14. The operation thereof is the same as described above.

In a modification as described above, but not shown, ~~it is of course that~~ the oxygen supplying portion 80 may be further provided with a solenoid valve and then the oxygen concentration in the exhausting pipe 14 may be increased by controlling the solenoid valve linked with a timer or a controller to allow the external air to be

introduced into the exhausting pipe 14.

The oxygen supplying portion 80 may further include an air introducing pipe 90 having an opening port 88 as shown in Fig. 13. Also, ~~The~~ the air introducing pipe 90 may further include a blowing fan 92 therein to thereby artificially increase a pressure ~~operated~~ to the plate 84 and to thereby allow the external air to be easily introduced into the exhausting pipe 14, resulting in ~~that~~ the oxygen concentration in the exhausting pipe 14 ~~is~~ being increased.

On the other hand, the invention may be used as an atmosphere purification system using an operation of an air-conditioner and a driving of vehicles.

As shown in Fig. 15, a radiator 104 is connected as a heat exchanger to an internal combustion engine 102 disposed ~~to~~ in an engine room 100 of vehicles. Cooling water is circulated between the internal combustion engine 102 and the radiator 104 to thereby allow ~~heats~~ heat generated in operating the internal combustion engine 102 to be discharged ~~to an external~~ externally.

The radiator 104 is provided with a cooling fan 106 for rotating at a low or a high speed according to a driving condition and a traveling speed of vehicles to allow an introduced air to be blown to the radiator 104. Further, the radiator 104 includes a plurality of cooling pins 110 so as to maximize a surface area, resulting in that energy contained in the cooling water flowing through a cooling pipe 112 is speedily discharged ~~to the external~~ externally.

A grille 114 is disposed to a front portion of ~~vehicles~~ the vehicle to ~~be thereby introduced an~~ introduce air therethrough, thereby passing through the radiator 104 in ~~driving the vehicles~~ a moving vehicle.

In the vehicles as constructed above, a photocatalyst is coated on the radiator 104 of the inventive atmosphere purification system in accordance with the present invention and, more ~~preferable~~ preferably, a photocatalyst layer 116 in

which the photocatalyst is deposited is coated on a surface of the cooling pin 110. ~~A various type~~ Various types of ~~photocatalyst~~ photocatalysts may be used, but the atmosphere purification system in accordance with the present invention utilizes titanium dioxide (TiO_2). As described above and is well known, the photocatalyst is ~~exited~~ excited by a specific wavelength, the process is expressed as the following reaction formula:

$TiO_2 \rightarrow TiO_2 (h+) + e^-$

$TiO_2 (h+) + e^-$ is an ion having a very strong reactivity, thereby ~~exiting~~ exciting H_2O or O_2 and then accelerating and redoubling a production of a free radical (J. of Adv Oxid. Techol Vol., No. 1, 1996, p67-p78). These ~~photoctalyst~~ photocatalysts are deposited in a carrier such as a gamma alumina to thereby form a photocatalyst layer.

The photic source for ~~exiting~~ exciting the coated photocatalyst utilizes sun's ray irradiated to an engine room 100 through a grille 114 of vehicles or ~~a~~ an ultraviolet lamp 118 for irradiating ~~a~~ an ultraviolet ray in a neighboring position of the radiator 104. The wavelength of the ultraviolet ray irradiated from the lamp 118 is about 360nm.

The ultraviolet lamp 118 is provided with a reflective mirror 120, wherein it is preferable that an inner side of the reflective mirror 120 is directed to the radiator 104 to thereby protect the ultraviolet lamp 118 from ~~an~~ a pressure due to a flow rate of air introduced through the grille 114 in traveling ~~the~~ vehicles and to thereby reflect the ultraviolet ray irradiated from the ultraviolet lamp 118, thereby increasing an irradiating amount of the ultraviolet ray to the radiator 104.

According to the above construction, since the inventive atmosphere purification system allows air to always flow through the grille 114 to the radiator 104 in traveling of the vehicles, when the air passes through the radiator 104, the

photocatalyst of the photocatalyst layer 116 is ~~exited~~ excited by the ultraviolet ray irradiated from the ultraviolet lamp 118 to thereby form a free radical capable of purifying pollutants such as VOC (volatile organic components) and nitrogen oxide contained in the air.

Please replace the paragraphs beginning at page 36, line 5 through page 36, line 25 with the following rewritten paragraphs.

As shown in Fig. 17, the air conditioner 130 comprises a compressor 132, a condenser 134, an expansion valve 136 and an evaporator 138 and can cool an ~~indoor~~ interior of the vehicle by a state change of a refrigerant circulating therein. The condenser 134 is provided with a plurality of cooling pins in order to easily perform a heat exchange, a photocatalyst layer containing a photocatalyst being coated on the pins. Further, when the photic source 140 as described above is ~~in~~ adjacent to the condenser 134, the air can be purified in the same manner as ~~descried~~ described above.

On the other hand, a cooling fan 142 is closely disposed to the evaporator 138 in order to allow a heat-exchanged cold air to ~~introduce~~ be introduced into the ~~indoor~~ interior and an air introducing port for smoothly introducing the air thereinto is disposed. Further, an inorganic filter 144 made of metal or inorganic substance is usually disposed ~~to~~ in the air introducing port for removing contaminants contained in the introduced air. Accordingly, if the photocatalyst layer in accordance with the present invention is coated on the filter 144, the introduced air into the ~~indoor~~ interior of vehicles is also purified.

Please replace the paragraphs beginning at page 38, line 1 through page 41, line 10 with the following rewritten paragraphs.

Lighting the cigarette 270, the compulsory transition operated by the small-sized pump 260 is performed until the interior of the transparent instrument 250 is invisible by the smoke of the cigarette. Then, the operation of the pump 260 stops and a photic reaction is introduced by supplying a power from the power supply 200 into the small-sized fan 240 and the electrodes 230 to thereby cause the air to ~~introduce~~ be introduced into the photic reactor, resulting in that the cigarette smoke and the smoking smell are ~~perfectly~~ completely removed from the transparent instrument 250 after 10-20 seconds. The ~~consume~~ consumed power is 120watt.

Referring now to Fig. 20 as a second experiment example, a honeycomb type, a pulverized type, or a sponge type carrier 280 is disposed to a front of the reactor as shown in Fig. 19, an activated carbon being coated on the carrier. The cigarette smoke is removed just after the pump 260 is operated, e.g., about 3 ~~second less then~~ seconds later. In this case, since the carrier is disposed to the front of the photic reactor and the activated carbon coated on the carrier 280 absorbs the cigarette smoke of a high concentration, the activated carbon serves as a kind of damper for preventing the cigarette smoke from being suddenly ~~introducing~~ introduced into the photic reactor. The cigarette smoke having a reduced concentration by the activated carbon is easily purified from the photic reactor and then components of the cigarette smoke absorbed to the activated carbon are progressively deodorized and purified in the photic reactor.

As described above, the exhaust gas purification system of the internal combustion engine in accordance with the present invention can improve the energy ~~effect~~ efficiency by increasing the purification ~~effect~~ efficiency and reducing ~~a consuming~~ power consumption relative to the prior art. That is, the plasma generated at an electrode by the supply of the power introduces a photic reaction and the ~~heats~~ heat generated in the reaction and the ~~heats~~ heat in the exhaust

gases redouble a 3-way catalyst reaction, thereby sufficiently removing pollutants in the exhaust gases and improving the purification effect.

Further, the photocatalyst coated on the honeycomb carrier is activated by a photic source supplied from the wire mesh or the honeycomb electrodes to thereby perform the purification reaction. Since the wire mesh or the honeycomb electrodes are closely or distinctly disposed to both ends of the honeycomb carriers, respectively, a plasma photic source is established by a proper ~~consume~~ consumption of power, thereby improving energy ~~effect~~ efficiency.

In case of the honeycomb electrodes, the 3-way catalyst layer is formed on the honeycomb carrier as well as an electrode cell surface of the honeycomb electrodes to thereby purify pollutants in exhaust gases by ~~heats~~ heat produced in generating the plasma and to thereby improve the purification ~~effect~~ efficiency by continuously maintaining the purification reaction ~~due to heats~~ by the heat of the exhaust gases although the plasma is not generated.

Further, the honeycomb electrodes are prepared using an equipment or installation for preparing the honeycomb without using a separate equipment or installation because the honeycomb electrodes are in the same form as the honeycomb carrier, thereby reducing a manufacturing cost.

Furthermore, since ~~it is used that~~ the electrodes used are in the form of a honeycomb, the electrodes are not damaged ~~in easy~~ easily by an external impact, thereby improving durability.

The purification system of the exhaust gases of the present invention is further provided with the oxygen supplying portion to thereby improve the exhausting purification effect and is useful to an environmental industry without being limited to the internal combustion engine.

Further, according to the present invention, the photocatalyst layer in which

the photo catalyst is deposited is coated on a radiator of vehicles, a condenser of an air conditioner of the vehicles or a filter portion of a blower side in such a way that the photocatalyst is exited by ~~a~~ an ultraviolet ray irradiated from the ultraviolet lamp to thereby purify pollutants contained in air passing through the radiator or the air introduced into an ~~indoor~~ interior of the vehicles when the vehicles are ~~traveled~~ moving. Accordingly, the present invention can purify the air during the travel of the vehicles irrespective of the settled purification capacity relative to the prior air purification system which is designed to adapt to an optional capacity in fixing in place as a fixing type and needs to a separate installation thereby reducing the installation cost. Further, the prior purification system needs ~~to~~ a separate operating cost, while the inventive purification system can purify the air during the travel of the vehicles without requiring the separate operating cost.